

## CHAPTER 52

# Abdominal Pain and Tenderness

### KEY TEACHING POINTS

- In patients with acute abdominal pain, the findings of rigidity, guarding, and percussion tenderness increase probability of peritonitis. All three of these findings are more accurate than rebound tenderness.
- In patients with right lower abdominal pain, McBurney point tenderness and an Alvarado score of 7 or more *increase* probability of appendicitis; an Alvarado score of 4 or less *decreases* probability of appendicitis.
- In patients with acute abdominal pain, administration of analgesics to the patient does not diminish the accuracy of bedside signs for appendicitis.
- In patients with acute abdominal pain, visible peristalsis, a distended abdomen, and hyperactive bowel sounds all increase the probability of bowel obstruction.
- In patients with acute or chronic abdominal pain, the positive abdominal wall tenderness test *decreases* probability of intra-abdominal pathology.

## ACUTE ABDOMINAL PAIN

### I. INTRODUCTION

Among patients presenting with acute abdominal pain and tenderness (i.e., pain lasting less than 7 days), the most common diagnoses are nonspecific abdominal pain (43% of patients), acute appendicitis (4% to 20%), acute cholecystitis (3% to 9%), small bowel obstruction (4%), and ureterolithiasis (4%).<sup>1-4</sup> The term *acute abdomen* usually refers to those conditions causing abrupt abdominal pain and tenderness and requiring urgent diagnosis and surgical intervention, such as appendicitis, bowel obstruction, and perforated intra-abdominal organs.

Although many patients with the acute abdomen undergo computed tomography (to distinguish perforation, abscess, and appendicitis from alternative disorders), bedside diagnosis remains a fundamental diagnostic tool in all patients with the acute abdomen.<sup>5</sup> Based just on the bedside findings, some patients can be safely discharged home without further imaging because the probability of peritonitis is so low, whereas others should proceed directly to the operating room because the probability of peritonitis is so high. Those patients whose bedside findings are equivocal or suggest abscess formation benefit most from further imaging.<sup>6</sup>

## II. THE FINDINGS

The two most common causes of the acute abdomen are (1) **peritonitis** from inflammation (appendicitis, cholecystitis) or perforation of a viscus (appendix, peptic ulcer of stomach or duodenum, diverticulum) and (2) **bowel obstruction**. Both peritonitis and obstruction cause abdominal tenderness. Additional findings are discussed later.

### A. PERITONITIS

The additional findings of peritonitis are guarding and rigidity, rebound tenderness, percussion tenderness, a positive cough test, and a *negative* abdominal wall tenderness test.

#### 1. GUARDING AND RIGIDITY

Guarding refers to *voluntary contraction* of the abdominal wall musculature, usually the result of fear, anxiety, or the laying on of cold hands.<sup>7</sup> Rigidity refers to *involuntary contraction* of the abdominal musculature in response to peritoneal inflammation, a reflex that the patient cannot control.<sup>7</sup> Experienced surgeons distinguish these two findings by: (1) distracting the patient during examination (e.g., engaging the patient in conversation or using the stethoscope to gently palpate the abdomen)<sup>8,9</sup> and (2) examining the patient repeatedly over time. Guarding, but not rigidity, diminishes with distraction and fluctuates in intensity or even disappears over time.

The first clinician to clearly describe rigidity was the Roman physician Celsus, writing in AD 30.<sup>10</sup>

#### 2. REBOUND TENDERNESS

To elicit rebound tenderness, the clinician maintains pressure over an area of tenderness and then withdraws the hand abruptly. If the patient winces with pain upon withdrawal of the hand, the test is positive. Many expert surgeons discourage using the rebound tenderness test, regarding it “unnecessary,”<sup>7,11</sup> “cruel,”<sup>5</sup> or a “popular and somewhat unkind way of emphasizing what is already obvious.”<sup>12</sup>

Rebound tenderness was originally described by J. Moritz Blumberg (1873–1955), a German surgeon and gynecologist, who believed that pain in the lower abdomen after abrupt withdrawal of the hand from the *left* lower abdominal quadrant was a sign of appendicitis (i.e., Blumberg sign).<sup>13</sup>

#### 3. PERCUSSION TENDERNESS

In patients with peritonitis, sudden movements of the abdominal wall cause pain, such as those produced during abdominal percussion. Percussion tenderness is present if light percussion causes pain.

#### 4. COUGH TEST

The cough test is based on the same principle as percussion tenderness (i.e., jarring movements of the abdominal wall cause pain in patients with peritonitis). The cough test is positive if the patient, in response to a cough, shows signs of pain, such as flinching, grimacing, or moving hands toward the abdomen.<sup>14</sup>

#### 5. ABDOMINAL WALL TENDERNESS TEST

In 1926, Carnett introduced the abdominal wall tenderness test<sup>15</sup> as a way to diagnose lesions in the abdominal wall that cause abdominal pain and tenderness and sometimes mimic peritonitis. In this test the clinician locates the area of maximal

tenderness by gentle palpation and then applies enough pressure to elicit moderate tenderness. The patient is then asked to fold the arms on the chest and lift the head and shoulders, as if performing a partial sit-up. If this maneuver causes increased tenderness at the site of palpation, the test is positive,<sup>16</sup> a finding traditionally decreasing the probability of peritonitis because tense abdominal wall muscles are protecting the peritoneum from the clinician's hands.

One well-recognized cause of acute abdominal wall tenderness is diabetic neuropathy (i.e., thoracoabdominal neuropathy involving nerve roots T7 to T11; lesions of T1 to T6 cause chest pain).<sup>17-19</sup> In addition to a positive abdominal wall tenderness test, characteristic signs of this disorder are cutaneous hypersensitivity, often of contiguous dermatomes, and weakness of the abdominal muscles causing ipsilateral bulging of the abdominal wall that resembles a hernia.<sup>18, 19</sup>

## B. APPENDICITIS

### 1. MCBURNEY POINT TENDERNESS

In a paper read before the New York Surgical Society in 1889, citing the advantages of early operation in appendicitis, Charles McBurney stated that all patients with appendicitis have maximal pain and tenderness "determined by the pressure of the finger (at a point) very exactly between an inch and a half and two inches from the anterior superior spinous process of the ilium on a straight line drawn from that process to the umbilicus."<sup>20-22</sup>

### 2. ROVSING SIGN (INDIRECT TENDERNESS)

Rovsing sign (Neils T. Rovsing, 1862–1927, Danish surgeon) is positive when pressure over the patient's *left* lower quadrant causes pain in the right lower quadrant.<sup>7</sup> Rovsing believed that firm pressure in the left abdomen would force gas backwards to the splenic flexure and through the transverse colon to the cecum, where the extra distention would produce pain in the right lower quadrant if the appendix is inflamed.<sup>23</sup>

### 3. RECTAL TENDERNESS

In patients with appendicitis and inflammation confined to the pelvis, rectal examination may reveal tenderness, especially on the right side; in addition, some patients with perforation may have a rectal mass (i.e., pelvic abscess).

### 4. PSOAS SIGN

The inflamed appendix may lie against the right psoas muscle, causing the patient to shorten that muscle by drawing up the right knee. To elicit the psoas sign, the patient lies down on the left side and the clinician hyperextends the right hip. Painful hip extension is the positive response.<sup>7,11</sup>

### 5. OBTURATOR SIGN

The obturator sign is based on the same principle as the psoas sign, that stretching a pelvic muscle irritated by an inflamed appendix causes pain. To stretch the right obturator internus muscle and elicit the sign, the clinician flexes the patient's right hip and knee and then internally rotates the right hip.<sup>7,11</sup>

## C. CHOLECYSTITIS AND MURPHY SIGN

Patients with acute cholecystitis present with continuous epigastric or right upper quadrant pain, nausea, and vomiting. The traditional physical signs are fever, right upper quadrant tenderness, and a positive **Murphy sign**. In 1903, the American surgeon Charles Murphy stated that the hypersensitive gallbladder of cholecystitis

prevents the patient from taking in a “full, deep inspiration when the clinician’s fingers are hooked up beneath the right costal arch below the hepatic margin. The diaphragm forces the liver down until the sensitive gallbladder reaches the examining fingers, when the inspiration suddenly ceases as though it had been shut off.”<sup>24</sup>

Most clinicians elicit the Murphy sign by palpating the right upper quadrant of the supine patient. In his original description, Murphy proposed other methods, such as the **deep-grip palpation technique**, in which the clinician examines the seated patient from behind and curls the fingertips of his or her right hand under the right costal margin, and the **hammer stroke percussion technique**, in which the clinician strikes a finger pointed into the right upper quadrant with the ulnar aspect of the other hand.<sup>24</sup>

**D. SMALL BOWEL OBSTRUCTION**

Small bowel obstruction presents with abdominal pain and vomiting. The traditional physical signs are abdominal distention and tenderness, visible peristalsis, and abnormal bowel sounds (initially, high-pitched tickling sounds followed by diminished or absent bowel sounds).<sup>7,11</sup> Signs of peritonitis (e.g., rigidity, rebound) may appear if portions of the bowel become ischemic.

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**III. CLINICAL SIGNIFICANCE**

EBM Boxes 52.1 to 52.4 present the physical findings of the acute abdomen. Two of the EBM Boxes (52.1 and 52.4) apply to *all* patients with acute abdominal pain, addressing diagnosis of peritonitis (see EBM Box 52.1) or small bowel obstruction (see EBM Box 52.4) (many of these pooled likelihood ratio [LR] estimates are based on more than 6000 patients). EBM Box 52.2 addresses bedside findings specific for appendicitis (i.e., focusing on patients with right lower quadrant pain), whereas EBM Box 52.3 applies to patients with right upper quadrant pain and suspected cholecystitis.

**A. PERITONITIS (SEE EBM BOX 52.1)**

In the studies reviewed in EBM Box 52.1, the principal cause of peritonitis was appendicitis, although some patients had perforated ulcers, perforated diverticuli, or cholecystitis. According to these studies, the findings increasing the probability of peritonitis the most are rigidity (LR = 3.6), percussion tenderness (LR = 2.4), and guarding (LR = 2.3). The finding that *decreases* the probability of peritonitis is a *positive* abdominal wall tenderness test (LR = 0.1). The presence or absence of rebound tenderness (positive LR = 2, negative LR = 0.4) shifts probability relatively little, confirming the long-held opinion of expert surgeons that rebound tenderness adds little to what clinicians already know from gentle palpation.

Unhelpful findings in these studies are fever, character of the bowel sounds, and rectal tenderness.

**B. SPECIAL TESTS FOR APPENDICITIS**

In patients with acute abdominal pain the *absence* of right lower quadrant tenderness decreases the probability of appendicitis (LR = 0.3; see EBM Box 52.2).

**I. INDIVIDUAL FINDINGS (SEE EBM BOX 52.2)**

All of the findings in EBM Box 52.2 apply to patients with suspected appendicitis (indeed the most common cause of peritonitis in these studies was appendicitis). Additional special tests that further increase the probability of appendicitis are McBurney point tenderness (LR = 3.4), positive Rovsing sign (LR = 2.3), and

**EBM BOX 52.1***Acute Abdominal Pain, Signs Detecting Peritonitis\**

Finding (Reference) <sup>†</sup>	Sensitivity (%)	Specificity (%)	Likelihood Ratio <sup>‡</sup> if Finding Is	
			Present	Absent
<b>Vital Signs</b>				
Fever <sup>25-37</sup>	20-96	11-86	1.4	0.7
<b>Abdominal Examination</b>				
Guarding <sup>2,26,31,33,35,36,38-45</sup>	13-90	40-97	2.3	0.6
Rigidity <sup>2,27,29,39,41,43,45-47</sup>	6-66	76-100	3.6	0.8
Rebound tenderness <sup>2,25-27,29-31,33-40,42-45,48-53</sup>	37-95	13-91	2.0	0.4
Percussion tenderness <sup>29,42,50</sup>	57-65	61-86	2.4	0.5
Abnormal bowel sounds <sup>2,41</sup>	25-61	44-95	NS	0.8
<b>Rectal examination</b>				
Rectal tenderness <sup>25-27,31,32,34,36,38,39,41-43,45,51,54</sup>	22-82	41-95	NS	NS
<b>Other Tests</b>				
Positive abdominal wall tenderness test <sup>16,55</sup>	1-5	32-72	0.1	NS
Positive cough test <sup>14,29,32,45,46,50,53</sup>	44-85	38-85	1.9	0.5

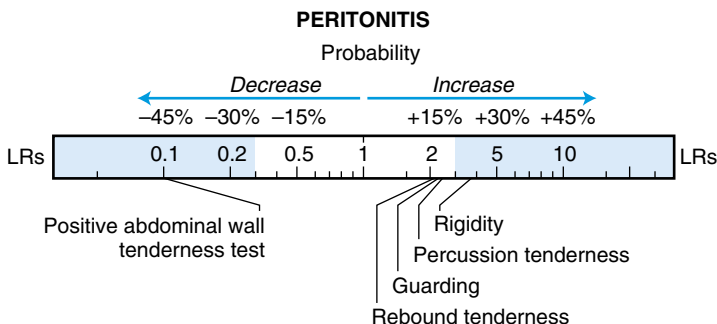
\*Diagnostic standard: for *peritonitis*, surgical exploration and follow-up of patients not operated on; causes of peritonitis included appendicitis (most common), cholecystitis, and perforated ulcer. One study also included patients with pancreatitis.<sup>41</sup>

<sup>†</sup>Definition of findings: for *fever*, most studies used  $>37.3^{\circ}\text{C}$ ; for *abnormal bowel sounds*, absent, diminished, or hyperactive; for *abdominal wall tenderness test*, see the text; for *positive cough test*, the patient is asked to cough, and during the cough shows signs of pain or clearly reduces the intensity of the cough to avoid pain.<sup>29</sup>

<sup>‡</sup>Likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

NS, Not significant.

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**EBM BOX 52.2**  
*Acute Abdominal Pain, Findings of Appendicitis\**

Finding (Reference) <sup>†</sup>	Sensitivity (%)	Specificity (%)	Likelihood Ratio <sup>‡</sup> if Finding Is	
			Present	Absent
Abdominal Examination				
Right lower quadrant tenderness <sup>25-27,29-31,35,36,38,39,41,43,45,50,53,56</sup>	65-100	1-92	1.9	0.3
McBurney point tenderness <sup>26,29,57</sup>	50-94	75-86	3.4	0.4
Rovsing sign <sup>26,31,32,40</sup>	7-68	58-96	2.3	0.8
Other Signs				
Psoas sign <sup>31,38,42</sup>	13-42	79-97	2.0	NS
Obturator sign <sup>38</sup>	8	94	NS	NS
Combination of Findings—Alvarado Score <sup>4,25,30,58-73</sup>				
7 or more	24-95	46-99	3.1	—
5-6 points	4-43	—	NS	—
4 or less	0-28	6-95	0.1	—

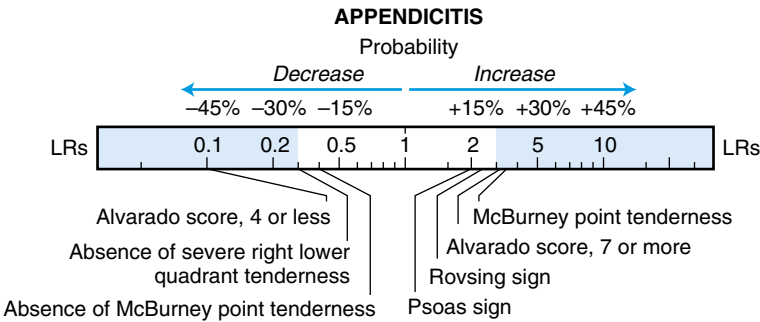
\*Diagnostic standard: for *appendicitis*, surgical findings, histology, and follow-up of patients not operated on.

<sup>†</sup>Definition of findings: for *Rovsing sign*, see the text; for *Alvarado score*, see Table 52.1.

<sup>‡</sup>Likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

NS, Not significant.

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positive psoas sign (LR = 2). The only special finding decreasing the probability of appendicitis (other than absence of right lower quadrant tenderness) is the absence of McBurney point tenderness (LR = 0.4).

McBurney point tenderness may have even greater accuracy if every patient's appendix were precisely at the McBurney point, but radiologic investigation reveals that the normal appendix sometimes lies a short distance away.<sup>82</sup> In one study of patients with acute abdominal pain, clinicians first located the patient's appendix using handheld ultrasound equipment. Maximal pinpoint tenderness over this



## Acute Right Upper Quadrant Tenderness, Signs Detecting Cholecystitis\*

Finding (Reference) <sup>†</sup>	Sensitivity (%)	Specificity (%)	Likelihood Ratio <sup>‡</sup> if Finding Is	
			Present	Absent
Fever <sup>74,77</sup>	29-44	37-83	NS	NS
Right upper quadrant tenderness <sup>41,56,74,76,78,79</sup>	60-98	1-97	2.7	0.4
Murphy sign <sup>56,78,80,81</sup>	48-97	48-98	3.2	0.6
Right upper quadrant mass <sup>74,76,77,79</sup>	2-23	70-99	NS	NS

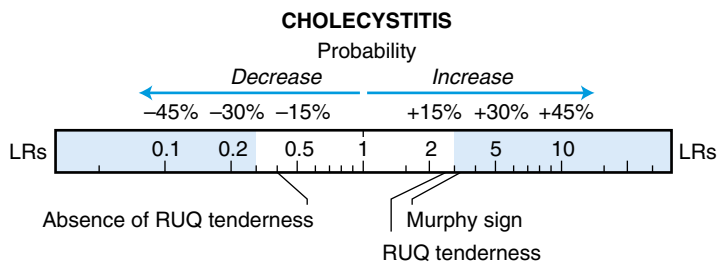
\*Diagnostic standard: for *cholecystitis*, positive hepatobiliary scintiscan<sup>78</sup> or surgical findings and histology.<sup>41,56,74,76,77,79-81</sup>

<sup>†</sup>Definition of findings: for fever, temperature >37.5°C,<sup>77</sup> >37.7°C,<sup>75</sup> >38°C,<sup>76</sup> or undefined.<sup>74</sup>

<sup>‡</sup>Likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

NS, Not significant.

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“sonographic McBurney point” had superior diagnostic accuracy for detecting appendicitis (sensitivity = 87%, specificity = 90%, positive LR = 8.4, negative LR = 0.1).<sup>83</sup>

In contrast to a long-held traditional teaching, giving analgesics to patients with acute abdominal pain does not change the accuracy of individual signs or reduce the clinician's overall diagnostic accuracy.<sup>84</sup>

Rectal tenderness (see [EBM Box 52.1](#)) and the obturator sign (see [EBM Box 52.2](#)) were diagnostically unhelpful in these studies. Nonetheless, a rectal examination should still be performed to detect the rare patient (2% or less) with a pelvic abscess and rectal mass.<sup>39,41</sup>

## 2. COMBINATION OF FINDINGS: THE ALVARADO SCORE

Many scoring systems have been developed to improve diagnostic accuracy and reduce the negative appendectomy rate in patients with acute right lower quadrant tenderness. One of the earliest and most widely used ones is the **Alvarado score** (see [Table 52.1](#)), which is also called **MANTRELS score**, based on the mnemonic Migration to the right iliac fossa, Anorexia, Nausea/Vomiting, Tenderness in the right iliac fossa, Rebound pan, Elevated temperature (fever), Leukocytosis, and Shift of leukocytes to the left.<sup>25</sup> In 19 studies of more than 4700 patients with acute abdominal pain, an Alvarado score



**EBM BOX 52.4**

*Acute Abdominal Pain, Signs Detecting Bowel Obstruction\**

Finding (Reference) <sup>†</sup>	Sensitivity (%)	Specificity (%)	Likelihood Ratio <sup>‡</sup> if Finding Is	
			Present	Absent
<i>Inspection of Abdomen</i>				
Visible peristalsis <sup>3</sup>	6	100	18.8	NS
Distended abdomen <sup>1,3,41</sup>	58-67	89-96	9.6	0.4
<i>Palpation of Abdomen</i>				
Guarding <sup>1,2,41</sup>	20-63	47-78	NS	NS
Rigidity <sup>1-3,41</sup>	6-18	75-99	NS	NS
Rebound tenderness <sup>1,2,41</sup>	22-40	52-82	NS	NS
<i>Auscultation of Abdomen</i>				
Hyperactive bowel sounds <sup>3,41</sup>	40-42	89-94	5.0	0.6
Abnormal bowel sounds <sup>1-3,41</sup>	63-93	43-88	3.2	0.4
<i>Rectal Examination</i>				
Rectal tenderness <sup>1,2,41</sup>	4-26	72-94	NS	NS

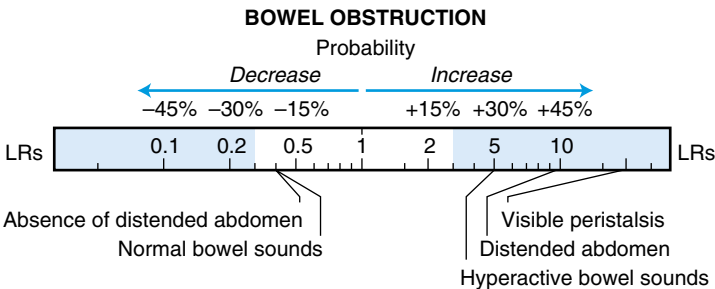
\*Diagnostic standard: for *small bowel obstruction*, surgical findings, abdominal radiographs, and clinical follow-up.

<sup>†</sup>Definition of findings: for *abnormal bowel sounds*, hyperactive, absent, or diminished bowel sounds.

<sup>‡</sup>Likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

NS, Not significant.

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of 7 or more increased probability of appendicitis (LR = 3.1; see [EBM Box 52.2](#)) and a score of 4 or less significantly decreased probability of appendicitis (LR = 0.1).

**C. CHOLECYSTITIS (SEE EBM BOX 52.3)**

In patients with right upper quadrant pain and suspected cholecystitis, the findings that increase the probability of cholecystitis are a positive Murphy sign



**TABLE 52.1** The Alvarado Score\*

Finding	Points
<b>SYMPTOMS</b>	
Migration	1
Anorexia	1
Nausea and vomiting	1
<b>SIGNS</b>	
Tenderness, right lower quadrant	2
Rebound tenderness	1
Elevation of temperature	1
<b>LABORATORY</b>	
Leukocytosis (white blood cell count > 10,000/ $\mu$ L)	2
Shift to the left (> 75% neutrophils)	1
<b>TOTAL POSSIBLE POINTS</b>	<b>10</b>

\*"MANTRELS" is an acronym for the Alvarado score (i.e., each letter representing the initial letters of items in the score).

†Definition of findings: for migration, classic migration of pain from periumbilical or epigastric area to right lower quadrant; for anorexia, may substitute acetone in urine; for elevation of temperature, oral temperature  $\geq 37.3^{\circ}\text{C}$ .

(LR = 3.2) and right upper quadrant tenderness (LR = 2.7). The absence of right upper quadrant tenderness decreases probability (LR = 0.4). The presence or absence of a right upper quadrant mass is unhelpful, probably because a palpable tender gallbladder is uncommon in cholecystitis (sensitivity less than 25%) and because the sensation of a right upper quadrant mass may occur in other diagnoses, such as liver disease or localized rigidity of the abdominal wall from other disorders.

There is also a *sonographic Murphy sign*, elicited during ultrasonography of the right upper quadrant, which is simply the finding of maximal tenderness over the gallbladder. Studies of this sign in patients with right upper quadrant pain reveal much better diagnostic accuracy than conventional palpation: sensitivity = 63%, specificity = 94%, positive LR = 9.9, and negative LR = 0.4.<sup>85</sup> The superior accuracy of this sign, which also relies on palpation of the abdominal wall, suggests that the poorer accuracy of conventional palpation is due to the difficulty precisely locating the position of the gallbladder.

Murphy sign may be less accurate in elderly patients because up to 25% of patients older than 60 years with cholecystitis lack any abdominal tenderness whatsoever.<sup>86</sup> Although most of these patients have abdominal pain, some have altered mental status and lack this symptom as well.

In patients with a pyogenic liver abscess the presence of the Murphy sign increases the probability of associated biliary tract sepsis (sensitivity = 32%, specificity = 88%, positive LR = 2.8, negative LR not significant).<sup>87</sup>

## D. SMALL BOWEL OBSTRUCTION (SEE EBM BOX 52.4)

In patients with acute abdominal pain the findings of visible peristalsis (LR = 18.8), abdominal distention (LR = 9.6), and hyperactive bowel sounds (LR = 5) increase the probability of bowel obstruction (though visible peristalsis is rare, occurring

in only 6% of affected patients). Diminished or absent bowel sounds also occur in obstruction, being found in one of four patients.<sup>3,41</sup>

The findings that decrease the probability of obstruction slightly are normal bowel sounds (i.e., not hyperactive, absent, or diminished) and absence of a distended abdomen (both LRs = 0.4). Nonetheless, 30% to 40% of patients with obstruction lack abdominal distention, especially early in the course or if the obstruction is high in the intestines. The findings of peritoneal irritation—rigidity and rebound tenderness—do not change the probability of obstruction.

## E. DIVERTICULITIS

Two studies have investigated the accuracy of **left lower quadrant tenderness** in patients with suspected diverticulitis. In an older study of 600 patients with acute abdominal pain (using operative findings as the diagnostic standard), left lower quadrant tenderness was specific (98%) but not sensitive (22%; positive LR = 13.8, negative LR = 0.8).<sup>41</sup> Sensitivity was low in this study because most patients with diverticulitis had more generalized abdominal tenderness. In another study of 163 patients with acute lower abdominal pain (using CT scan as the diagnostic standard), left lower quadrant tenderness was more sensitive (76%) but less specific (65%; positive LR = 2.2, negative LR = 0.4).<sup>88</sup> Specificity was lower in this study because many more mimicking disorders were included than in the previously mentioned study, such as enteritis, colon cancer, gynecologic abnormalities, and ischemic colitis.

## F. RENAL COLIC

In one study of 1333 patients presenting with acute abdominal pain, two findings were accurate signs of ureterolithiasis (as diagnosed by imaging or follow-up): loin tenderness (sensitivity = 15%, specificity = 99%, positive LR = 27.7, negative LR = 0.9) and renal tenderness (sensitivity = 86%, specificity = 76%, positive LR = 3.6, negative LR = 0.2). As compelling as these findings are, they are less accurate than the finding of microscopic hematuria, which has a sensitivity of 75%, specificity of 99%, positive LR of 73.1, and negative LR of 0.3.<sup>89</sup>

# CHRONIC ABDOMINAL PAIN

In two studies of patients with chronic abdominal pain, the abdominal wall tenderness test (see the section on Abdominal Wall Tenderness Test) significantly *decreased* the probability of a visceral cause of the pain (LR = 0.1; [EBM Box 52.5](#)). A positive abdominal wall tenderness test also increased the probability that the patient's pain would respond to an injection of combined anesthetic/corticosteroid into the tender spot and that *no* serious pathology would be discovered during 3 or more months of follow-up (LR = 7).<sup>90</sup>

Beyond this finding, there is relatively little information on the accuracy of examination in diagnosing chronic abdominal pain. Most studies show that the finding of abdominal tenderness is common in many nonorganic disorders and has little diagnostic value. In patients with suspected biliary colic, right upper quadrant tenderness does not distinguish patients with cholelithiasis from those without, although lower abdominal tenderness modestly decreases the probability of cholelithiasis (LR = 0.5; see [EBM Box 52.5](#)). In patients with dyspepsia, epigastric tenderness does not help to predict whether upper endoscopy will reveal an ulcer, some other abnormality, or normal findings.

**EBM BOX 52.5***Chronic Upper Abdominal Pain\**

Finding (Reference) <sup>†</sup>	Sensitivity (%)	Specificity (%)	Likelihood Ratio <sup>‡</sup> if Finding Is	
			Present	Absent
Positive abdominal wall tenderness test, detecting visceral pain <sup>90,91</sup>	11-13	15-21	0.1	4.9
Right upper quadrant tenderness, detecting cholelithiasis <sup>92</sup>	53	51	NS	NS
Lower abdominal tenderness, detecting cholelithiasis <sup>92</sup>	21	57	0.5	1.4
Epigastric tenderness, detecting positive upper endoscopy <sup>93</sup>	63	31	NS	NS

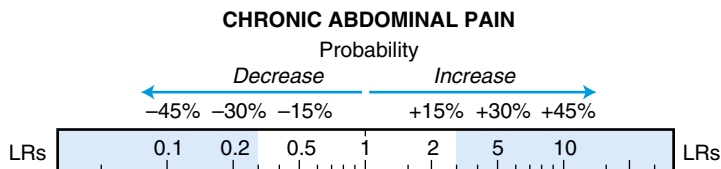
\*Diagnostic standard: for *cholelithiasis*, ultrasonography or oral cholecystogram<sup>92</sup>; for *positive upper endoscopy*, findings on upper gastrointestinal endoscopy, most of which were peptic ulcers; for *visceral pain*, pain originating from an intra-abdominal organ or structure (i.e., not abdominal wall).

<sup>†</sup>Definition of findings: for *abdominal wall tenderness test*, see the text.

<sup>‡</sup>Likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

NS, Not significant.

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Positive abdominal wall tenderness test, arguing against visceral pain

Even if the finding of tenderness has little diagnostic value in patients with chronic abdominal pain, abdominal examination is still important to detect masses, organomegaly, and signs of a surgical abdomen.

The references for this chapter can be found on [www.expertconsult.com](http://www.expertconsult.com).

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